Wisconsin Highway Research Program
Request for Proposals
FY 2008

Problem Title

Wisconsin Mixture Characterization Using the SPT on Historical Aggregate Structures

Background and Problem Statement

In conjunction with Wisconsin efforts to move forward with the national trend into Mechanistic Design theory, it was felt that a unique opportunity exists to evaluate historically used aggregate structures in developing an initial reference database. While other studies are focused on developing the methodology and ultimate criteria, this study would allow evaluation of job mix formulas traditionally being used in Wisconsin, and provide the base language to identify successful materials performance, with the intent to duplicate.

While most would agree that this information would be greatly beneficial in order to increase knowledge of currently used Wisconsin mixtures, the problem exists for the department in having the resources to generate values for the desired database. Without this starting point there will be limited hope in trying to correlate any existing performance data (good or poor) to materials traditionally used, and would delay conclusions out additional years creating a huge economic disadvantage and a potential for increased product risk.

Scope of Work/Objective

Part of this research project will involve use of SPT equipment at the WisDOT Technical Services Central AASHTO accredited Laboratory facility with the intent of performing a majority of the laboratory modulus analysis work there. This research will also involve, but not be limited to, the following tasks:

1. Mixing already blended aggregate samples (at the JMF optimum Pb).
2. Compacting and coring specimens to the required SPT specimen geometry
3. Determining dynamic modulus (E*) and flow characteristics for each JMF
4. Cataloging mixtures based on a number of categories (geographic location, aggregate source, aggregate type, ESAL levels, specific materials properties, etc.)
5. Building a partial comparison analysis involving the initial 2 years of actual performance data (gathered from WisDOT provided PIF files).
6. Develop training tools and guidance to generate efficient use of research results. This step is intended to further implement research data interpretation to enhance HMA mix design and product application.

Note: the first two tasks will be required to be performed by HTCP certified technicians

Specific Results, Findings Tools, etc. (Deliverables)

Project deliverables include:

1. Mechanistic evaluation of historical/traditional gyratory compacted mix designs
2. A Cross-Reference Mixture Catalog (listings by Aggregate Source, Aggregate Type, Traffic Levels, etc).
3. A written report and evaluation of JMFs, related to early service life project performance.
4. Training tools (visuals) to enhance technology transfer.
5. 85 printed copies of the final Catalog and Analysis report to be distributed to WisDOT (80) and WHRP (5), as well as one electronic copy of the final version of the catalog and report.

Length of Research and Approximate Cost to Complete

It is anticipated that this research will be completed in 12 months for a cost of approximately $90k. The study is not controlled by the construction season and can be performed anytime throughout the fiscal year. Time and cost estimates supplied in the research proposals will be evaluated by the TOC as part of the selection criteria.

Urgency and Potential Research Benefits

In order to take full advantage of studies being completed at a national level, as well as current Wisconsin Research, it is felt that this mixture characterization project will allow the department and its contractors to identify already successful mix designs and aggregate structures, so as not to re-invent the wheel in moving ahead with mechanistic design methodologies.

The resultant catalog will provide the common ground and language for both buyer and seller of HMA. It will also offer confidence for any/all specifying agencies to step into mechanistic design methodology realizing limited risk to the product for the taxpayers.

This project also offers opportunity for the successful proposer to involve academia and industry, utilizing the shared expertise of both, to advise on proposed specification changes addressing any under or over designing of product, resulting in a more efficient and economic system of materials usage.